CLAIMS

1. An electro-optical cell (1) comprising:

first (2) and second (3) support members at least one of which is transparent to optical radiation (6) passing through the cell;

an electro-optical medium (5) between the support members; and

an electrode arrangement (11, 12) on both first and second support member to apply an electric field to the electro-optical medium (5), wherein the direction of the applied field can be changed from at least a first non-zero field distribution to at least a second non-zero field distribution, different from the first field distribution, by modifying the voltages of the electrodes, and wherein the direction of the first field distribution is other than opposite to that of the second field distribution.

2. An electro-optical cell (1) according to claim 1 wherein the electrodes (11, 12) are configured such that the first field distribution is generally perpendicular to the support members (2, 3) and the second field distribution is generally aligned with the support members (2,3).

3. An electro-optical cell (1) according to claim 1 wherein the electrodes are configured to realise at least two electric field distributions wherein one of them is generally perpendicular to the support members (2, 3) and the other one is generally at an oblique angle (7) with respect to the support members (2, 3).

4. An electro-optical cell (1) according to claim 1 wherein the electrodes are configured to realise at least two electric field distributions wherein one of them is generally aligned with the support members (2, 3) and the other one is generally at an oblique angle (7) with respect to the support members (2, 3).

5. An electro-optical cell (1) of any one of claim 1 to 4 wherein the electrode arrangement (11, 12) includes a pair of electrodes (11a, 12a) comprising a first electrode (11a) on the first support member (2) and a second electrode (12a) on the second support member (3) and the first and second electrodes can be addressed such that the first field distribution is applied between the first and the second electrodes.

6. An electro-optical cell (1) of claim 5 wherein the electrodes of the first pair (11a, 12a) are arranged such that the first field distribution in the electro-optical medium in use is substantially perpendicular with respect to the support members (2,3).

7. An electro-optical cell (1) of claim 5 or 6 wherein a second pair of electrodes (11b, 12b) is arranged adjacent to the first pair of electrodes on the first and second support members.

8. An electro-optical cell (1) of claim 7 wherein the electrodes of the first and second pairs (11a, 12a, 11b, 12b) can be addressed to apply the second field distribution.

9. An electro-optical cell (1) of claim 7 wherein the first and second pairs of electrodes (11a, 12a, 11b, 12b) are arranged such that the second field distribution in the electro-optical medium in use is aligned with the support members (2, 3).

10. An electro-optical cell (1) of any one of the preceding claims wherein the electro-optical medium (5) comprises cholesteric liquid crystals.

11. An electro-optical cell (1) of any one of claims 1 to 9 wherein the electro-optical medium (5) comprises anisometric, suspended particles (4).

12. An electro-optical cell (1) in claim 11 wherein the arrangement of at least the first pair of electrodes is operable to align the particles (4) in dependence on the first field distribution perpendicular to the support members (2, 3) such that the cell can be switched to a transmissive mode.

13. An electro-optical cell (1) of claim 11 or 12 wherein the arrangement of the first and second pairs of electrodes (11a, 12a, 11b, 12b) are operable to align the particles (4) in dependence on the second field distribution aligned with the support members (2, 3) such that the cell can be switched into a non-transmissive mode.

14. An electro-optical cell (1) of claim 13 wherein the electro-optical medium (5) comprises reflecting particles such that the non-transmissive mode is also a reflective mode.

15. An electro-optical cell (1) of any one of claims 11 to 14 wherein a third pair of electrodes (11c, 12c) is arranged adjacent and in line with the first and second pair of electrodes (11a, 12a, 11b, 12b) on the first and second support members (2, 3).

16. An electro-optical cell (1) of claim 15 wherein the electrodes of the first, second and third pair of electrodes (11a-11c, 12a-12c) can be addressed to apply a third field distribution.

17. An electro-optical cell (1) of claim 16 wherein the electrodes of the first, second and third pair (11a-11c, 12a -12c) of electrodes are arranged such that the third field distribution in the electro-optical medium (5) in use is at an oblique angle (7) to the support members (2, 3).

18. An electro-optical cell (1) of claim 17 wherein the oblique angle (7) of the third field distribution can be tuned by addressing the electrodes of the first, second and third pair (11a-11c, 12a-12c) of electrodes appropriately.

19. An electro-optical cell of claim 17 or 18 wherein the electrode arrangement on the first, second and third pair of electrodes (11a-11c, 12a - 12c) is operable to align the anisometric, reflecting particles (4) in dependence on the third field distribution at an oblique angle (7) to the support members (2, 3) such that the cell can be switched into a partly deflective state.

20. An electro-optical cell (1) of claim 19 wherein the electrode arrangement of the first, second and third pairs of electrodes (11a-11c, 12a-12c) is such that the cell can be switched from a first field distribution corresponding to a transmissive state to a second field distribution corresponding to a reflective state to a third field distribution corresponding to a deflective state.

21. An electro-optical cell (1) of any one of claims 11 to 20 wherein the first and second pair of electrodes (11a, 12a, 11b, 12b) are arranged in a first row (R1) of electrodes and the cell comprises a second row (R2) of electrodes such that a matrix of four electrodes (11a, 12a, 11b, 12b) are formed on each of the support members.

22. An electro-optical cell (1) of claim 21 wherein the electrodes (11, 12) can be addressed to form two perpendicular field distributions and the electrodes are arranged such that a particle (25) in the electro-optical medium subject to the two perpendicular field distributions can only have one degree of freedom.

23. An electro-optical cell (1) of claim 22 wherein the particle (25) can be orientated subject to the two perpendicular field distributions perpendicular to or aligned with the support members (2, 3) such that the cell can be switched to a transmissive or highly reflective state by changing at least one of the two perpendicular field distributions.

24. An electro-optical cell (1) of claim 22 and 23 wherein the two perpendicular electric field distributions are applied simultaneously or repeatedly.

25. An electro-optical cell (1) of claim 15 to 20 wherein the first, second and third pair of electrodes (11a-11c, 12a-12c) form a third row of electrodes (R1) and the cell comprise a fourth (R2) and a fifth (R3) row forming a matrix of nine electrodes (11a-11i, 12a-12i) on each of the support members (2, 3).

26. An electro-optical cell (1) of claim 25 wherein the electrodes (11, 12) can be addressed to form two perpendicular field distributions and the electrodes are arranged such that a particle (25) in the electro-optical medium (5) subject to the two perpendicular field distributions can only have one degree of freedom.

27. An electro-optical cell (1) of claim 26 wherein the particle (25) can be subject to the two perpendicular field distributions perpendicular to, aligned with or at an oblique angle (7) to the support members (2,3) such that the cell can be switched to a transmissive, highly reflective or deflecting state by changing at least one of the two perpendicular field distributions.

28. An electro-optical cell (1) of claim 26 and 27 wherein the two perpendicular electric field distributions are applied simultaneously or repeatedly.

29. An electro-optical cell (1) according to any one of claims 11 to 28 further comprising driving electronics to change the charge of the electrodes (11, 12) on the first and second support member (2, 3) in order to switch the orientation of the suspended particles (4).

30. An electro-optical cell (1) of any preceding claim further comprising more than one layer (5, 14) of dielectric material between the support members (2, 3),

where said layers consist of materials of varying dielectric constants in order to reduce the inhomogeneities in the electric field produced in the electro-optical medium (5).

31. An electro-optical (1) cell according to any one of the preceding claims wherein the electrode arrangement is disposed solely on the support members (2, 3).

32. An electro-optical cell (1) according to any one of the preceding claims wherein the support members (2, 3) comprise generally parallel plates.

33. An electro-optical cell (1) comprising:

first (2) and second (3) support members at least one of which is transparent to optical radiation (6) passing through the cell;

an electro-optical medium (5) between the support members; and

more than one electrode (11, 12) on each of the first and second support member to apply an electric field to the electro-optical medium (5), wherein the direction of the applied field can be changed from at least a first non-zero field distribution to at least a second non-zero field distribution, different from the first field distribution, by modifying the voltages of the electrodes.

34. An apparatus comprising: first and second support members (2, 3);

a medium (5) between the support members comprising suspended particles (24, 25); and

an electrode arrangement on both first and second support member to apply a first and second electric field distribution to the medium, wherein the direction of the first and second field distribution in use are perpendicular

causing the suspended particles subject to the first and second field distribution to only have one degree of freedom.